

REMARKS

In the Office Action,¹ the Examiner :

- (a) objected to claims 9 and 18 because of informalities;
- (b) rejected claims 1-5, 8-14, 16, and 18-19 under 35 U.S.C. § 102(e) as being unpatentable over Hafeez et al. (U.S. Patent No. 6,920,191) ("Hafeez"); and
- (c) rejected claims 6-7, 15, 17, and 20 under 35 U.S.C. § 103(a) as being unpatentable over Hafeez in view of Shattil (U.S. Patent Publication No. 2002/0034191) ("Shattil").

Applicants amend claims 1, 4-9, 13-18, and 20 to improve form and clarity. Upon entry of this Amendment, claims 1-20 will remain pending in this application. Applicants respectfully traverse the rejections for the following reasons.

Objection to Claims 9 and 18 because of informalities:

The Examiner objected to claims 9 and 18 because of informalities. In particular, the Examiner stated "'non-channel distortion' is interpreted as distortion produced by non-channel function by examiner. Please verify if this interpretation is correct" (Office Action, p. 3).

In response, Applicants amend claims 9 and 18. Claim 9 now recites, *inter alia*, "the first signal including non-channel distortion, wherein the non-channel distortion is produced by a non-channel function." Claim 18 now recites, *inter alia*, "providing an approximation of non-channel distortion in the first signal, wherein the non-channel distortion is produced by a non-channel function." Thus, Applicants deem the objection overcome.

¹ The Office Action may contain statements characterizing the related art, case law, and claims. Regardless of whether any such statements are specifically identified herein, Applicants decline to automatically subscribe to any statements in the Office Action.

Rejection of Claims 1-5, 8-14, 16, and 18-19 under 35 U.S.C. § 102(e):

Applicants traverse the rejection of claims 1-5, 8-14, 16, and 18-19 under 35 U.S.C. § 102(e) as being anticipated by Hafeez. Applicants respectfully disagree with the Examiner's arguments and conclusions.

In order to properly establish anticipation under 35 U.S.C. § 102, the Federal Circuit has held that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). See also M.P.E.P. § 2131.

Hafeez does not track each and every element recited in the claims, despite the Examiner's allegations. For example, Hafeez does not teach "[a] signal processing method comprising: ... obtaining an approximation of the pulse shaping distortion; extracting the approximation of the pulse shaping distortion from the first signal to obtain a second signal ...," as recited in claim 1. The Examiner alleged that Hafeez teaches "obtaining an approximation of the pulse shaping distortion (106, 108, 109 and 112 in Fig. 3)" (Office Action, p. 3). However, this is not correct.

As indicated in the Amendment filed on July 23, 2007, Hafeez discloses that "[a]n impulse response is a mathematical function that describes the output waveform that results when the input is excited by a unit impulse function" (col. 1, lines 28-30). Hafeez further discloses that "[a]dditionally, pulse-shape estimator 112 calculates the impulse

response of the receive filter 106 as described in reference to FIG. 1" (col. 8, lines 22-24, emphasis added). In particular, Hafeez teaches that "[i]n general, by comparing the sampled received signal $y(n)$, which corresponds to the training symbols after transmission and processing by downconverter 104 and receive filter 106, to the expected pre-stored training symbols 113, pulse-shape estimator 112 estimates the pulse-shape response of the receive filter 106" (col. 3, lines 23-29, emphasis added). However, calculating or estimating a response function of a filter, as taught by Hafeez, does not constitute "obtaining an approximation of the pulse shaping distortion," as recited in claim 1.

In response to Applicants' arguments in the Amendment filed on July 23, 2007, the Examiner alleged that "Hafeez discloses an estimation of the pulse shape response in a wireless receiver, ... The pulse-shape response estimate can also be used to compensate for pulse-shape distortion (Col 8, L12-15)" (Office Action, p. 2, emphasis added). Whether this allegation is correct or not, Hafeez does not teach "obtaining an approximation of the pulse shaping distortion," as recited in claim 1 (emphasis added). The Examiner further alleged that "[i]t is clear that both pulse shape filter and pulse shape estimator perform mathematical calculations on pulse shaping distortion of the received signal" (Office Action, p. 2). However, this is not correct.

As admitted by the Examiner, Hafeez teaches "[t]he pulse-shape response estimate can also be used to compensate for pulse-shape distortion due to manufacturing defects or other variations in analog receive filters" (col. 8, lines 12-15, emphasis added). As noted above, Hafeez also teaches "pulse-shape estimator 112 calculates the impulse response of the receive filter 106 as described in reference to

FIG. 1" (col. 8, lines 22-24, emphasis added). However, Hafeez does not teach "perform mathematical calculations on pulse shaping distortion of the received signal," as alleged by the Examiner, nor does Hafeez teach "obtaining an approximation of the pulse shaping distortion," as recited in claim 1 (emphasis added).

Furthermore, the "pulse-*shape* distortion" of Hafeez does not constitute the claimed "pulse *shaping* distortion." Although closely similar in terminology, the teachings of Hafeez and the element of claim 1 represent very different concepts.

Regarding the concept of Hafeez, Hafeez discloses that "due to manufacturing and component variability, the pulse-shape response may not perfectly match the intended pulse-shape response. . . . Distortion in the pulse-shape response may cause inter-symbol interference (ISI) and/or adjacent channel interference (ACI)" (col.1, lines 52-59, emphasis added). Hafeez further discloses that "[t]he pulse-shape response estimate can also be used to compensate for pulse-shape distortion due to manufacturing defects or other variations in analog receive filters" (col. 8, lines 12-15, emphasis added).

Regarding the claim element, Applicants' specification states: "[t]he first term is the original spreading code of the n^{th} symbol of i^{th} user . . . [and the second term] $\Delta_i(jn)$ is the small fixed PS distortion to the spreading code due to the pulse shaping, as shown in Figure 1" (p.9, par. [029]) and "[w]ith the PS function distortion subtracted from received signal $r(t)$, $r'(t)$ has no PS effects" (p.10, par. [030], emphasis added). The concept of Hafeez and the claim element are thus very different.

As specified in the M.P.E.P., "[d]uring patent examination, the pending claims must be 'given their broadest reasonable interpretation consistent with the

specification” (*M.P.E.P. § 2111, 8th Ed., Rev. 5 (August 2006)*, emphasis added).

Accordingly, the “pulse-shape distortion” of Hafeez, which is the “[d]istortion in the pulse-shape response” and is due to “manufacturing and component variability,” does not constitute the claimed “pulse shaping distortion,” which is the distortion in the received signal and is “produced by pulse shaping” (emphasis added). Accordingly, Hafeez fails to teach “obtaining an approximation of the pulse shaping distortion,” as recited in claim 1.

In addition, Hafeez does not teach “extracting the approximation of the pulse shaping distortion from the first signal to obtain a second signal,” as recited in claim 1. The Examiner alleged that Hafeez teaches “separating the approximation of the pulse shaping distortion from the first signal to obtain a second signal (316 in Fig. 3, Col 9, L19-25)” (Office Action, p. 4). However, this is not correct.

Hafeez discloses that “[c]ompensation filter 316 may be designed to zero-force ISI (inter-symbol interference) caused by pulse-shape distortion by selecting a given sampled Nyquist pulse-shape as the target response ... Symbol-rate pulse-shape compensation eliminates ISI and also whitens the noise if the transmit filter is Nyquist (but the receive filter is not)” (col. 9, lines 19-25). However, this does not constitute “extracting the approximation of the pulse shaping distortion from the first signal to obtain a second signal,” as recited in claim 1.

With respect to claim 9, similar to the discussion above in connection with claim 1, Hafeez does not teach “[a] signal processing method comprising: ... obtaining an approximation of the non-channel distortion; extracting the approximation of the non-channel distortion from the first signal to obtain a second signal that includes a

time-varying channel function ...,” as recited in claim 9. The Examiner alleged that “[t]he non-channel function is pulse shaping (PS) function according to the current application specification ([0026])” (Office Action, p. 2). Whether this allegation is correct or not, Hafeez does not teach “[a] signal processing method comprising: ... obtaining an approximation of the non-channel distortion; extracting the approximation of the non-channel distortion from the first signal to obtain a second signal that includes a time-varying channel function ...,” as recited in claim 9. Therefore Hafeez fails to teach each and every element recited in claim 9.

With respect to claim 18, similar to the discussion above in connection with claim 1, Hafeez fails to teach “[a] signal processing system, comprising: ... an approximating device ... for providing an approximation of non-channel distortion in the first signal ... and a signal-extracting device, coupled to the approximating device, for extracting the approximation of the non-channel distortion from the first signal to obtain a second signal that includes a time-varying channel function ...,” as recited in claim 18. Therefore Hafeez fails to teach each and every element recited in claim 18.

In view of the foregoing, Hafeez does not anticipate independent claims 1, 9, and 18. Independent claims 1, 9, and 18 are allowable, and dependent claims 2-5, 8, 10-14, 16, and 19 are also allowable at least by virtue of their dependence from one of allowable base claims 1, 9, and 18. The 35 U.S.C. § 102(e) rejection is therefore improper and should be withdrawn.

Rejection of Claims 6-7, 15, 17, and 20 under 35 U.S.C. § 103(a):

Applicants traverse the rejection of claims 6-7, 15, 17, and 20 under 35 U.S.C. § 103(a) as being unpatentable over Hafeez in view of Shattil. No *prima facie* case of obviousness has been established.

The key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. Such an analysis should be made explicit and cannot be premised upon mere conclusory statements. See *M.P.E.P. § 2142, 8th Ed., Rev. 6 (Sept. 2007)*. “A conclusion of obviousness requires that the reference(s) relied upon be enabling in that it put the public in possession of the claimed invention.” *M.P.E.P. § 2145*. Furthermore, “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art” at the time the invention was made. *M.P.E.P. § 2143.01(III), internal citation omitted*. Moreover, “[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.” *M.P.E.P. § 2141.02(I), internal citations omitted (emphasis in original)*.

“[T]he framework for objective analysis for determining obviousness under 35 U.S.C. 103 is stated in *Graham v. John Deere Co.*, 383 U.S. 1, 148 U.S.P.Q 459 (1966).... The factual inquiries ... [include determining the scope and content of the prior art and] ... [a]scertaining the differences between the claimed invention and the prior art.” *M.P.E.P. § 2141(II)*. “Office personnel must explain why the difference(s)

between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art." *M.P.E.P. § 2141(III)*.

Here, a *prima facie* case of obviousness has not been established because the Examiner has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the claimed invention and the prior art. Accordingly, the Examiner has failed to clearly articulate a reason why the prior art would have rendered the claimed invention obvious to one of ordinary skill in the art.

Claims 6 and 7 depend upon base claim 1. As explained above, Hafeez does not teach "[a] signal processing method comprising: ... obtaining an approximation of the pulse shaping distortion; extracting the approximation of the pulse shaping distortion from the first signal to obtain a second signal ...," as recited in claim 1 and required by dependent claims 6 and 7. Shattil fails to cure Hafeez's deficiencies. The Examiner alleged that "Shattil discloses a wireless communication system comprise[s] an approximate solution that is obtained from a first-order perturbation calculation ([0678])" (Office Action, p.7). However, whether this allegation is correct or not, neither Hafeez nor Shattil, nor any combination thereof, teaches "[a] signal processing method comprising: ... obtaining an approximation of the pulse shaping distortion; extracting the approximation of the pulse shaping distortion from the first signal to obtain a second signal ...," as recited in base claim 1 and required by dependent claims 6 and 7.

Furthermore, neither Hafeez nor Shattil, nor any combination thereof, teaches "[the extracting comprises] applying at least one order of perturbation to adjust the approximation of the pulse shaping distortion," as recited in claim 6, and "[the extracting comprises] applying at least one equalization; and repetitively applying at least one

order of perturbation to adjust the approximation of the pulse shaping distortion,” as recited in claim 7.

In view of the shortcomings of the prior art and the errors in analysis of the prior art set forth in the Office Action, the Examiner has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the claimed invention and the prior art. Thus, the Examiner has failed to clearly articulate a reason why the prior art would have rendered the claimed invention obvious to one of ordinary skill in the art. Accordingly, no *prima facie* case of obviousness has been established. Independent claim 1 is therefore allowable, and dependent claims 6 and 7 are also allowable at least by virtue of their dependence from base claim 1. The 35 U.S.C. § 103(a) rejection of claims 6 and 7 is therefore improper and should be withdrawn.

With respect to claims 15 and 17, similar to the discussion above in connection with claims 6 and 7, the applied references, taken alone or in combination, fail to teach “[a] signal processing method comprising: ... obtaining an approximation of the non-channel distortion; extracting the approximation of the non-channel distortion from the first signal to obtain a second signal that includes a time-varying channel function ...,” as recited in claim 9. In addition, the Examiner has failed to clearly articulate a reason why the prior art would have rendered the claimed invention obvious to one of ordinary skill in the art, and no *prima facie* case of obviousness has been established. Independent claim 9 is therefore allowable, and dependent claims 15 and 17 are also allowable at least by virtue of their dependence from base claim 9. The 35 U.S.C. § 103(a) rejection of claims 15 and 17 is therefore improper and should be withdrawn.

With respect to claim 20, similar to the discussion above in connection with claims 6 and 7, the applied references, taken alone or in combination, fail to teach “[a] signal processing system, comprising: ... an approximating device ... for providing an approximation of non-channel distortion in the first signal ... and a signal-extracting device, coupled to the approximating device, for extracting the approximation of the non-channel distortion from the first signal to obtain a second signal that includes a time-varying channel function ...,” as recited in claim 18. Furthermore, the Examiner has failed to clearly articulate a reason why the prior art would have rendered the claimed invention obvious to one of ordinary skill in the art, and no *prima facie* case of obviousness has been established. Independent claim 18 is therefore allowable, and dependent claim 20 is also allowable at least by virtue of its dependence from base claim 18. The 35 U.S.C. § 103(a) rejection of claim 20 is therefore improper and should be withdrawn.

Conclusion:

In view of the foregoing, Applicants request reconsideration of the application and withdrawal of the rejection. Pending claims 1-20 are in condition for allowance, and Applicants request a favorable action.

If there are any remaining issues or misunderstandings, Applicants request the Examiner telephone the undersigned representative to discuss them.


Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: December 19, 2007

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